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How to use JoRes ship scale open data for CFD validation?

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ABSTRACT

CFD made its way into the maritime community a few decades ago and has since become an integral part of it. Thousands of calculations are conducted globally to design new hulls, optimise propellers, etc. The International Maritime Organization (IMO) provided significant encouragement in 2021 by officially recognising CFD as an alternative to model tests. However, it is important to validate CFD methods to make sure the simulations provide realistic results. This realisation led to the establishment of the JoRes Joint Research project in 2019. Within the JoRes project, the global community developed a collection of ship-scale validation cases consisting of seven vessels. The access to the website jores.net became public in December 2024, and there is an opportunity to participate in international workshops to validate your CFD methods. The conference presentation aims to delve into the background of the JoRes project, discuss the collected results, and suggest the best strategy for using them.

		MV Regal	JoRes1 Tanker	JoRes2 RoRo ferry	JoRes3 Cruise liner	JoRes4 Deniz tug	JoRes5 bulk carrier	Lucy Ashton
	Geometry files formats	.igs .stp .stl	.igs .stp .stl	.3dm .igs .stp .stl .dbs	.igs .stp .stl	.igs .stp .stl	.igs .stp .stl	.igs .stp .x_t
Dimensions	Length between perpendiculars, m	138.0	178.5	170.0	226	18.28	182.0	58.1
	Breadth moulded, m	23.0	32.26	27.7	32.2	7.46	32.26	6.4
Model tests	Model tests at the trials draughts	SINTEF and CSSRC	SSPA and HSVA	N	N	N	N	6 models
Geometry details	Energy Saving Device (ESD)	N	PBCF, skeg, rudder plate	Twisted rudders	Twisted rudders	Ducts	Pre Swirl Stators	N
	Propeller	1FPP, 4 blades	1FPP, 4 blade	2CPP, 4 blades	2FPP, 5 blades	2FPP, 4 blades	1FPP, 4 blades	No :)
	Average Weld seams width, mm	N	24.5	22.2	N	N	N	N
	Information about Anodic protection	Y	Y	Y	Y	Y	N	Y
	Information about Bulge keels	Y	Y	Y	Y	Y	N	Y
Roughness	Equivalent sand grain hull roughness, μm	440	53	17	15	66	53	59 - 97
	Equivalent sand grain rudder roughness, μm	440	63	22	230	132	63	N
	Equivalent sand grain propeller roughness, μm	6	4	3	Y	Y	4	n/a
Trials condition	Deep water trials	Y	Y	Y	Y	Y	Y	Y
	Shallow water trials	N	N	N	Y	N	N	N
Speed and Power trials	Sea trials speeds, kn	9.03 10.96 11.76 12.82	8.96 11.25 13.34 14.14	16.66	~12	~6 ~7.5 ~8.5 ~10	13.65 15.25 16.02 16.32	5-15
	Draughts	Ballast	Loaded	Ballast	Ballast	n/a	Ballast	n/a
	Propeller torque measurements	Y	Y	Y	Y	Y	Y	n/a
	Propeller thrust measurements	Y	N	Y	Y	N	N	n/a

	PIV flow measurements	N	Y	N	N	N	N	N
	Cavitation observations	Y	N	N	N	N	Y	n/a
	Pressure pulses measurements	Y	N	N	N	N	N	n/a
	Drone videos of wave pattern	Y	N	N	N	Y	N	N
	Bridge videos of wave pattern	Y	N	N	N	N	N	N
	Trials with and without ESD	N	N	N	N	N	Y	Y
Manoeuvring trials	Zig-zag 10 deg tests	N	N	N	Y	Y	N	N
	Zig-sag 20 deg tests	N	N	N	Y	Y	N	N
	Turning circle	N	N	N	N	Y	N	N
	Inertia Stop	N	N	N	N	Y	N	Y
	Acceleration	N	N	N	N	Y	N	Y
	Crash Stop	N	N	N	N	Y	N	N
	Bollard pull	N	N	N	N	Y	N	N
	Long-term monitoring data	Y	N	Y	Y	N	N	N